# Predictive Value of a Revised Forced Choice Form of the Manifest Anxiety Scale

by

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## Foreword

This report is a modification of a dissertation submitted to the faculty of the Department of Psychology of the State University of Iowa in partial fulfillment of the requirements for the Ph.D. degree. It was carried out, in part, in connection with a project concerned with the influence of motivation on performance in learning under Contract N9 onr-93802, Project NR 154-107 between the State University of Iowa and the Office of Naval Research.

The writer is indebted to Drs. I. E. Farber and H. P. Bechtoldt, under whose direction this investigation was completed.

A list of the reports made thus far under the above contract is given on page 22.

# Predictive Value of a Revised Forced Choice Form of the Manifest Anxiety Scale

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The predictive utility of the Taylor Anxiety Scale (17, 18) has been demonstrated in a variety of situations. It has been shown, among other things, that anxious Ss, i. e., those obtaining high scores on the Taylor Scale, give more conditioned eyelid responses during both conditioning (11, 13, 14, 17) and extinction (11) than do nonanxious Ss, and tend to give more responses to both positive and negative stimuli in differential eyelid conditioning (4, 12). In verbal learning situations, the effect of anxiety upon level of performance has been shown to depend upon the specific nature of the experimental task. If the strengths of the correct response tendencies are relatively high, anxious Ss tend to perform better than nonanxious Ss; if, however, the strengths of the correct tendencies are weak relative to those of the incorrect tendencies, the level of performance of anxious Ss has been found to be inferior to that of nonanxious Ss (8, 9, 16).

Although the items used in the Taylor A-scale were selected by clinical psychologists as indicative of anxiety, Heineman (3) has recently pointed out that scores on this test may be influenced by a response set, which is perhaps not closely related to anxiety, to make socially favorable self-judgments. Evidence to support this supposition consists in the positive skewness of the distribution of scores on the A-scale standardization group and in the high negative correlation between the MMPI K-scale and the A-scale (1, 3).

In order to reduce the possible effects of such a favorability factor, Heineman (3) constructed a forced choice version of the A-scale which requires Ss to respond to two of three grouped statements, consisting of an anxiety statement, a nonanxiety statement which is paired in terms of favorability with the anxiety statement, and a third nonanxiety statement differing in favorability from the other two. Heineman showed that use of this forced choice scale was effective in correcting the positive skewness of the A-scale distribution and in reducing the correlation between anxiety scores and the K-scale. He also demonstrated that responses to the forced choice scale were relatively insensitive to deliberate faking induced by instruction to Ss to respond so as to give the best possible impression of themselves.

Additional findings by Taylor, Farber, and Kabrick (15) also indicated that the forced choice form was not so susceptible to a favorability effect as the A-scale. Thus, when both tests were administered in a single session, A-scale scores were significantly higher when the test was given before rather than after the forced choice scale. The forced choice scores, however, were significantly lower when it was given before rather than after the A-scale. It appeared that favorability effects on the A-scale transferred to the other test taken subsequently, whereas the lack of favorability effects on the forced choice form affected scores on the A-scale taken subsequently, as a result of the recall of previous responses and tendencies to consistency.

While the forced choice scale seemed to reduce the effects of favorability, its predictive utility, as compared with the Taylor A-scale, was not evaluated by Heineman. Furthermore, the wording of 28 of the partic-

ular anxiety items used by Heineman (3) has recently been modified by Taylor (18) in order to improve their comprehensibility. The present investigation, therefore, was concerned with the following: the construction of a forced choice form of the reworded Taylor scale; an analysis of the revised form in terms of its reliability, normative characteristics, and correlations with other scales; a comparison of the revised form with Heineman's forced choice scale in these respects; and the investigation of the relative predictive utility of the revised forced choice scale and the reworded Taylor scale in a differential eyelid conditioning situation and in a verbal learning situation.

## Procedure

### Construction of the Revised Forced Choice Scale

The forced choice anxiety scale constructed by Heineman (3) used two sets of anxiety statements. In one set of 50 items, or blocks, designated FC-1, the anxiety statements were those used in the Taylor A-scale. In the second set of 50 blocks, designated FC-2, the anxiety statements were not part of the Taylor Scale, but consisted of items whose correlation with the total score on the A-scale was greater than .40. The total test of 100 blocks was designated FC-T.

The present revised forced choice form, based on the reworded A-scale and referred to hereafter as RFC-1, is essentially a revision of FC-1 and consists of 11 blocks which are identical with those used in Heineman's FC-1, and 39 blocks which have been revised. Anxiety statements were defined as the 50 items of the reworded A-scale (10). Non-anxiety statements were defined as those items of the MMPI and Wesley

Rigidity Scale which were judged by either none, or only one, of the five clinicians used by Taylor as indicative of manifest anxiety; or, if not rated by the clinicians, which correlated .24 or less with the Taylor A-scale.[1] The RFC-1 scale and Heineman's FC-2 scale were combined in a 100-block test booklet (RFC-T).

RFC-1 included the 28 anxiety items reworded by Taylor (18) and also incorporated the following additional modifications: only negatively worded statements or only positively worded statements were grouped in any one block; for this purpose eight of Heineman's FC-1 blocks were revised; three other FC-1 blocks containing unreworded anxiety items, whose favorability indices in the present study differed by .20 or more from those obtained by Heineman for these same items, were also revised.

To obtain an index of the social favorability of the reworded anxiety statements, the 240 items of the 1952 Iowa Biographical Inventory[2] containing the reworded Taylor scale were rated by 102 Ss from beginning psychology classes on the same 5-point scale used by Heineman. The mean ratings thus obtained were used in the present study as the favorability indices for reworded anxiety items and for the 11 unreworded anxiety items in those blocks which were revised. The mean

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1 The relevant data were obtained from an unpublished study by Dr. H. P. Bechtoldt.

2 This form of the Iowa Biographical Inventory also contains the F, K, and L scales of the MMPI, the Wesley Rigidity Scale (20), a Hostility Scale (7), and Welsh's (19) anxiety items.

favorability ratings obtained by Heineman were used as the favorability indices for all nonanxiety items as well as for the anxiety items in those blocks retained intact from Heineman's scale.

In accordance with Heineman's general procedure, each revised forced choice block consisted of three statements; an anxiety statement; a nonanxiety statement whose mean favorability did not differ by more than .13 from that of the anxiety statement; and a second nonanxiety statement whose mean favorability differed from that of the anxiety statement by .85 or more. Other criteria used by Heineman in the selection of items for the construction of forced choice blocks were also followed in the present study.

Scoring

Ss were instructed to indicate the one item most descriptive and the item least descriptive of themselves in each block. The scoring procedure considered only the anxiety item and its matching nonanxiety item in each block, and corresponds to the Key 2 scoring of FC-T discussed by Heineman (3).

Subjects

The RFC-T was administered to 221 and 273 Ss respectively in successive semesters of an introductory psychology course. A total of 24 Ss were eliminated because of incomplete test scores or failure to follow instructions. Analysis of scores was based on the remaining 211 Fall Semester and 259 Spring Semester Ss.

Fall Semester Ss took the 1952 Iowa Biographical Inventory about 10 weeks prior to the administration of the RFC-T scale. In taking RFC-

T, 107 Ss recorded their answers on an IBM-scored answer sheet, and 104 Ss recorded their answers on the conventional hand-scored answer sheet. Spring Semester Ss were given both the 1952 Iowa Biographical Inventory and the RFC-T scale in a single session, with 127 Ss taking the 1952 Iowa Biographical Inventory first, and 132 Ss taking the RFC-T scale first. For all Spring Semester Ss the hand-scored answer sheet was used.

Cut-off points defining anxious and nonanxious Ss were set at the interval limit nearest the 20th and 80th per centiles in the distribution of scores. Since inspection of the Fall Semester distributions indicated that the means and SD's of the group using the IBM answer sheet were similar to those of the group using the conventional answer sheet, cutting points were based on the combined distribution of scores for both groups. Since the two Spring Semester distributions, however, were shown to be influenced by sequence of administration (15), separate cutting scores were established for each.

Four categories of Ss were selected from the extremes of the various distributions. The 45 Ss (22 men, 23 women) whose scores fell in the upper extreme of the reworded A-scale, but not in the upper extreme of the RFC-1 distribution composed the HA group; 46 Ss (11 men, 35 women) whose scores were in the upper extreme of the RFC-1 distribution, but not in the upper extreme of the reworded A-scale distribution were designated as the HFC group. A similar procedure utilizing the lower extremes of the distributions resulted in the classification of 48 Ss (22 men, 26 women) in the low A-scale (LA) group; and 34 Ss (23 men, 11 women) in the low forced choice (LFC) group.

From the total of 163 Ss thus selected, criterion measures were

analyzed for 62 Ss (13 HA, 13 LA, 18 HFC, and 18 LFC) who participated in a differential eyelid conditioning experiment and for 68 Ss (18 HA, 18 LA, 16 HFC, and 16 LFC) who participated in a verbal learning experiment.[3]

Criterion Tasks

The procedure for the differential eyelid conditioning experiment has been described in a study reported by Spence and Farber (12). In the verbal learning experiment, criterial measures were obtained on a list of 12 pairs of two-syllable adjectives having no meaningful similarity among the stimulus terms nor among the response terms, but with a high association between each stimulus and its response term, as shown by Haagen (2). The list was presented on a Hull-type memory drum, with the stimulus term exposed for two seconds, followed by a two-second exposure of both terms of the pair before the next stimulus term appeared. Trials were continued to a criterion of two successive errorless recitations.

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[3] Both of these experiments were carried out as part of a project under contract with the Office of Naval Research. The present data for differential eyelid conditioning are taken from those reported by Spence and Farber (12, Experiment II), omitting three Ss (1 HFC, 2LA), in order to provide proportionality among the groups for purposes of statistical analysis. The present data for verbal learning were taken from an unpublished study. Five Ss' (3 HA, 2 HFC) in verbal learning were discarded to provide proportionality.

## Results and Discussion

### Relations Among Revised Forced Choice Scale, Reworded A-scale, and K-scale

Since the correlations among the scales for each of the four groups (i. e., IBM answer sheet, hand-scored answer sheet, reworded A-scale preceding RFC-1, and RFC-1 preceding the A-scale), were found to be homogeneous, according to tests of homogenity of correlation between groups given by Rider (10), they were combined, giving a single score for each relation. Table 1 presents the intercorrelations among the reworded A-scale, RFC-1, FC-2, and the K-scale for the combined groups, and also, for purposes of comparison, the intercorrelations among the homologous indices reported by Heineman (3).[4] The intercorrelations, in the present study, among the various anxiety scales, i. e., the reworded A-scale, RFC-1, and FC-2, were all of similar magnitude, about..60, significantly lower ($p < .001$) than the test-retest coefficient reported by Taylor (18) for the reworded A-scale. The negative correlations of the K-scale with RFC-1 and with FC-2 were significantly lower ($p < .001$) than that between the K-scale and the reworded A-scale.

Comparisons with corresponding correlations found by Heineman showed that only the correlation of RFC-1 with FC-2 differed significantly ($p < .01$, $t = 2.82$, $df = 664$) from a corresponding correlation obtained by Heineman (FC-1 and FC-2). The correlation between the two sets of FC items in the present test appears to be about the same as that between the present test and the Taylor A-scale.

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[4] The corresponding scales in the present test and Heineman's respectively, are: RFC-1 and FC-1; FC-2 and FC-2 (identical); and RFC-T (RFC-1 plus FC-2) and FC-T (FC-1 plus FC-2).

Table 1

Correlations Among the Reworded A-scale, RFC-1, FC-2, and K-Scale in Present Study (N = 470) and in Heineman's study (N = 209)

| | A | | RFC-1 (FC-1) | | FC-2 | |
|---|---|---|---|---|---|---|
| | Present Study | Heine-man | Present Study | Heine-man | Present Study | Heine-man |
| RFC-1 (FC-1) | .59 | .60 | | | | |
| FC-2 | .59 | .58 | .61 | .74 | | |
| K | -.69 | -.74 | -.32 | -.36 | -.35 | -.41 |

## Reliability

Internal consistency estimates of reliability were computed for the reworded A-scale, RFC-1, and FC-2, using the Kuder-Richardson Formula 21 (5). Reliability estimates for the four groups were combined on the basis of Rider's (10) test of homogeneity. The average within group estimates of reliability are presented in Table 2, together with those given by Heineman (3) for the corresponding scales.

The reliability coefficients for RFC-1 and FC-2 scores were significantly lower ($p < .001$) than the reliability of the reworded A-scale. In turn, RFC-1 scores were less reliable than FC-2 scores ($p < .01$).

Compared with Heineman's data for FC-1, FC-2, and the A-scale, RFC-1 was significantly less reliable than FC-1 ($p < .05$), and FC-2 in the present study was less reliable than Heineman's FC-2, although this difference was not significant. In view of the reduced variability of RFC-1 scores indicated below, the lower reliability of RFC-1 may have resulted, in part, from a decrease in discrimination among Ss.

## Normative characteristics

Table 3 presents the means, medians, SD's, and ranges of scores for the reworded A-scale, RFC-1, and FC-2, as well as those given by Heineman for the corresponding scales.[1] (These normative data do not include the RFC-1 scores of the 127 Ss who took the forced choice form immediately after taking the reworded A-scale, since their scores on RFC-1 differed significantly ($p < .01$) from those of the other three groups. They also do not include the reworded A-scale scores of the 132 Ss who took this test immediately after the forced choice form, since those Ss

Table 2

Reliability Coefficients (Internal Consistency) and Standard Errors of Measurement of Reworded A-scale, RFC-1, and FC-2 in Present Study (N = 470) and in Heinoman's Study (N = 209)

| | Present Study | | Heinoman | |
|---|---|---|---|---|
| | r | SE | r | SE |
| Reworded A-Scale (A) | .85 | 3.08 | .85 | 2.97 |
| RFC-1 (FC-1) | .56 | 3.44 | .69 | 3.46 |
| FC-2 | .65 | 3.44 | .70 | 3.45 |

Table 3

Summary Statistics for the A-scale, RFC-1, and FC-2

| | N | Mean | Median | SD | Range |
|---|---|---|---|---|---|
| Present Study | | | | | |
| Reworded A-scale | 338* | 14.11 | 13 | 7.76 | 1 - 38 |
| RFC-1 | 343** | 30.20 | 30 | 5.19 | 13 - 42 |
| FC-2 | 470 | 29.25 | 30 | 5.85 | 9 - 44 |
| Heineman's Data | | | | | |
| A-scale | 209 | 13.68 | 13 | 7.66 | 1 - 34 |
| FC-1 | 209 | 25.58 | 26 | 6.22 | 9 - 42 |
| FC-2 | 209 | 26.91 | 27 | 6.30 | 9 - 42 |

* Ss given reworded A-scale immediately following RFC-1 not included.

**Ss given RFC-1 immediately following reworded A-scale not included.

differed significantly ($p < .001$) from the other groups on the A-scale (cf. 15). Since FC-2 scores did not differ in the four groups, they were combined).

Mean RFC-1 scores were significantly higher than FC-2 ($p < .05$), even though the difference was less than one point, and is, perhaps, unimportant. Both sets of scores in the present experiment were higher than corresponding FC-1 and FC-2 means obtained by Heineman ($p < .001$). The variability of the RFC-1 scores was smaller than that shown by Heineman for FC-1. Bartlett's test of homogeneity of variance indicated that the reduction in variance was significant at the .01 level of confidence. The distribution of reworded A-scale scores was shown to be positively skewed by a test given by McNemar (6), with the deviation from normality significant at the .001 level of confidence. The distribution of RFC-1 scores did not depart significantly from normality, although the skewness index was negative. The distribution of FC-2 scores was negatively skewed at the .001 level of confidence. The positive skewness of the reworded A-scale distribution and its elimination in the RFC-1 distribution were consistent with Heineman's interpretation of a decrease in influence of social favorability on forced choice scores.

Relation Between Anxiety and Differential Eyelid Conditioning

The means and SD's of conditioned eyelid responses to the positive stimulus for the two anxious groups, HA and HFC, and the two nonanxious groups, LA and LFC, are given in Table 4. Table 5 summarizes the analysis of variance for these data. It is apparent that the anxious groups showed a higher level of response than the nonanxious. The F for anxiety

Table 4

Frequency of CR's to Positive Stimulus

| | Anxious | | | Nonanxious | | |
|---|---|---|---|---|---|---|
| Scale | N | M | SD | N | M | SD |
| A | 13 | 23.85 | 10.44 | 13 | 18.62 | 11.60 |
| FC | 18 | 27.78 | 11.27 | 18 | 16.78 | 10.28 |

Table 5

Summary of Analysis of Variance of CR's to Positive Stimulus

| Source | df | MS | F | p |
|---|---|---|---|---|
| Scale | 1 | 16.55 | .13 | |
| Anxiety | 1 | 1141.23 | 9.00 | <.01 |
| S x A | 1 | 125.62 | .99 | |
| Within groups | 58 | 126.84 | | |
| Total | 61 | | | |

level was significant at the .01 level of confidence. The difference between level of performance of anxious and nonanxious Ss was slightly greater when anxiety was measured by the forced choice form than when it was measured by the A-scale. However, neither the effects of scale nor the anxiety by scale interaction differed from chance expectation.

The means and SD's of conditioned responses to the negative stimulus are given in Table 6. The summary of the analysis of variance for these data is shown in Table 7. As in the case of the results for the positive stimulus, level of response was significantly higher for the anxious than for nonanxious Ss. Again, the difference in level of performance between anxious and nonanxious Ss was greater when anxiety was measured by the forced choice form than when it was measured by the A-scale, but not significantly so. The results indicate that both RFC-1 and the A-scale were effective in predicting level of performance in differential eyelid conditioning. But there was no statistically significant evidence that one was more useful than the other.

Since there were fewer Ss designated in the anxious extreme when RFC-1 was used than when the A-scale was used, due to chance variations in setting cut-off points, it is possible that LFC Ss may generally have been less anxious than LA Ss. However, examination of Tables 4 and 6 indicates that, if this was so, it was not reflected in performance, since the level of performance for the nonanxious groups was very nearly equal, with LFC Ss showing a slightly poorer performance with respect to the positive stimulus and slightly better performance on the negative stimulus, as compared with LA Ss.

Table 6

Frequency of CR's to Negative Stimulus

| | Anxious | | | Nonanxious | | |
|---|---|---|---|---|---|---|
| Scale | N | M | SD | N | M | SD |
| A | 13 | 18.31 | 9.60 | 13 | 11.31 | 10.15 |
| FC | 18 | 22.28 | 11.20 | 18 | 12.78 | 8.78 |

Table 7

Summary of Analysis of Variance of CR's to Negative Stimulus

| Source | df | MS | F | p |
|---|---|---|---|---|
| Scale | 1 | 111.70 | 1.05 | n.s. |
| Anxiety | 1 | 1107.16 | 10.38 | <.01 |
| S x A | 1 | 23.59 | .22 | |
| Within groups | 58 | 106.62 | | |
| Total | 61 | | | |

Verbal learning

Table 8 shows the means and SD's of the error scores in the paired associates learning for the anxious groups, HA and HFC, and for the nonanxious groups, LA and LFC. Table 9 presents the analysis of variance for these data. Level of performance, in terms of error scores, was better for anxious than for the nonanxious groups, at the .02 level of confidence. In contrast to the eyelid conditioning results, the difference in level of performance between anxious and nonanxious Ss was greater when anxiety was measured by the A-scale than when it was measured by the forced choice form. However, this difference was not significant. These results were consistent with the interpretation that both the reworded A-scale and RFC-1 were about equally useful in predicting level of performance in a verbal learning situation in which the number and strengths of competing responses are relatively low.

## Summary

The present study was concerned with the construction and evaluation of a revised forced choice form (RFC) of the reworded Taylor Manifest Anxiety Scale (18). The method of construction followed the general procedure employed by Heineman (3) in the development of a forced choice form of the original Taylor scale, and was devised to reduce the effects of possible tendencies by Ss to consider the social desirability of particular responses.

The data obtained from administration of the RFC and Taylor's reworded A-scale to 470 Ss indicated that the RFC is less susceptible than the A-scale to the effects of favorability, as shown by the

Table 8

Number Errors in Verbal Learning

| | Anxious | | | Nonanxious | | |
|---|---|---|---|---|---|---|
| Scale | N | M | SD | N | M | SD |
| A | 18 | 14.67 | 7.73 | 18 | 25.50 | 21.23 |
| FC | 16 | 22.75 | 10.14 | 16 | 30.75 | 17.49 |

Table 9

Summary of Analysis of Variance of Errors in Verbal Learning

| Source | df | MS | F | p |
|---|---|---|---|---|
| Scale | 1 | 752.94 | 3.06 | n.s. |
| Anxiety | 1 | 1534.25 | 6.24 | $<.02$ |
| S x A | 1 | 34.00 | .14 | |
| Within groups | 64 | 245.72 | | |
| Total | 67 | | | |

elimination of skewness and a lower negative correlation with the MMPI K-scale. However, the reliability of the RFC was significantly lower than that of the reworded A-scale, and also lower than Heineman's forced choice scale. The mean score for RFC was greater, and the variability was smaller than that for Heineman's scale.

Four groups composed of 18 anxious Ss selected from the upper extreme and 18 nonanxious Ss selected from the lower extreme of the RFC, and 13 Ss in each group selected from the upper and lower extremes of the reworded A-scale participated in a differential eyelid conditioning situation. Anxious Ss showed a significantly higher level of response to both positive and negative stimuli than nonanxious Ss. There was no significant effect associated with the form of the test, i. e., RFC vs. A-scale. Four groups of Ss, 16 selected from each extreme of RFC and 18 from each extreme of the reworded A-scale, learned a simple list of paired-associates. Anxious Ss showed fewer errors in learning the list than did nonanxious Ss, but there was no evidence that one scale was significantly more useful than the other.

These results indicated that, although the forced-choice form of the manifest anxiety test may be less influenced by favorability factors than the conventional A-scale, there is no reason to suppose that the two forms differ in their ability to predict performance in eyelid conditiining or simple verbal learning.

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